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Yes, hurricanes are by definition natural disasters, spawned by the primordial forces of sun, water, air, and earth. But even as science is ever more certain that human activity has intensified hurricanes themselves, there are a slew of other anthropogenic problems that have intensified their horrific effects. Perhaps the greatest is the curse of chemical pollutants—artificial toxic substances absorbed and unleashed by Mother Nature.

The storm-fueled spread of contamination is already an acute concern among those living in the Houston area, which was battered late last month by Hurricane Harvey. The region has several hazardous-waste sites currently managed by the federal and state governments. Among them are 13 Superfund sites. These are industry-contaminated, abandoned areas that the

Environmental Protection Agency has slated for cleanup, or where it has [redacted] massive construction projects to contain the chemicals. Or, at least, that's the goal.

Parts of Greater Houston saw 40 inches or more of total rainfall as Harvey stalled over the city. The flooding caused explosions at the Arkema chemical plant in Crosby, Texas, which has already led to a lawsuit alleging that Arkema's negligence exposed first responders to poisonous fumes. And pollutants have washed up in neighborhoods. Along the San Jacinto River, just across from one hazardous waste site, poisonous globules of mercury appeared on the banks days after the storm.

According to Yvette Arellano, a research fellow with Texas Environmental Justice Advocacy Services, or TEJAS, residents have been more concerned about the chemicals from local industrial wastelands than they are about the floodwaters still lingering in many parts of the area. "I think we're all exhausted," said Arellano, who is a local herself. "A lot of people want a lot of answers."

## Word that no major leaks have been reported may be little comfort to local communities.

Of particular concern to residents is a fenced-off Superfund site in Houston's Fifth Ward community—where an old metal-casting foundry and chemical-recycling facility leached lead into the ground—and various sites along the San Jacinto. Residents smelled creosote, a derivative of tar, during the flood and

saw sheens in pooling water that they feared might have come from petrochemical spills.

Their concerns were captured in a recent story from the Associated Press. Reporters Michael Biesecker and Jason Dearen described how in the immediate aftermath of Harvey, one particular concern was the San Jacinto River Waste Pits site, an ongoing remediation of an old paper-mill waste dump that had once leaked potentially carcinogenic dioxins into the surrounding soil and groundwater. The site had been covered by an "armored cap" of a waterproof lining covered with rocks to keep contaminants from further leaking in the case of a flood.

Biesecker and Dearen also reported that EPA officials had not yet visited the 13 Harvey-affected Superfund sites near Houston. The agency claimed the locations had "not been accessible by response personnel," though Dearen was able to reach most of them by boat and car. The EPA criticized the story—and Biesecker personally—after it was published on September 3, though the agency did not dispute specific facts in the team's reporting. On September 6, the EPA and its state partner, the Texas Commission on Environmental Quality, announced that TCEQ had completed initial inspections of most sites.

David Gray, the acting deputy regional administrator for the EPA's Region 6 office, which includes Texas, told me evaluations have continued since then. "EPA completed site assessments at all 43 Superfund sites affected by the

storm," Gray wrote in an email. "Of these sites, two (San Jacinto and U.S. Oil Recovery) require additional assessment efforts."

The "armor" part of the armored cap covering the San Jacinto waste pits—the layer of rocks—had been at least partially displaced during the flood, although no damage to the liner itself has been reported so far. At the U.S. Oil recovery site in Pasadena, where the EPA has attempted to keep used oil products from entering waterways, crews were working to vacuum floodwaters from the facilities, Gray said, adding that "no sheen or odor was observed in the overflowing water." He anticipated that further assessment at both sites would take several days.

Still, word that no major leaks have been reported may be little comfort to local communities, which already have to plan for low-level contamination incidents and the risk of further contamination thanks to regular (albeit more mundane) flooding in the area. Many of those communities tend to fall into TEJAS's "environmental justice" category; marginalized by race, income, or both, they face the greatest dangers from contamination and the longest road to recovery.

Superfund sites aren't the only polluted zones affected by Harvey. There are several Resource Conservation and Recovery Act–managed areas—active dumping or waste sites being managed by the EPA—around Houston, too. But Superfund sites contain some of the worst hazards—old plants and dumps that operated before the EPA's rules were in place—the mitigation of which requires federal oversight and funding. Environmentalists told me after Harvey that the agency may not be up to the task, and that its readiness is in decline.

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 established the EPA's Superfund program to remediate or recover contaminated sites that couldn't continue to be used. Though federal funding

kicks in if offending companies won't foot the bill, it hasn't always been adequate.

Originally, environmental taxes on chemical manufacturers and other companies supported the government's share. But since the taxes were repealed in 2001, appropriations from the federal general fund have paid for the program. That money dwindled in the ensuing years, since Congress always appropriated less than the expected revenue from the old taxes, and the number of Superfund cleanups plummeted. Environmental activists and lawyers fear the EPA's capabilities to monitor and manage Superfund sites are diminishing, too. And one key component of that monitoring and management is disaster response.

## Harvey isn't the first hurricane to threaten people with contamination and test the EPA's mettle.

"I see a severe problem with the lack of funding for EPA, because it renders them unable to respond to a disaster like this," said Lisa Evans, a senior counsel at the environmental-law organization Earthjustice. "One has to budget for these inevitable contingencies, otherwise you can leave those communities high and dry."

Harvey isn't the first hurricane to threaten people with contamination and test the EPA's mettle. Perhaps the worst-case scenario for Houston right now is what happened in the Gulf region after Hurricane Katrina in 2005. According to Erik Olson, the director of the health program at the Natural Resources Defense Council, flooding from Katrina, and from Hurricane Rita just weeks later, clearly disrupted hazardous-waste sites at dozens of Superfund and RCRA sites.

"The problem is that you could see a lot of waste that was supposedly 'under control' getting mobilized into waterways and spreading throughout the community," Olson said. Working with the NRDC and other environmental groups, local residents did their own water testing and "found widespread contamination around Superfund and RCRA sites."

That contamination was eventually confirmed through numerous assessments by the EPA and outside researchers. A 2009 study from Mary Fox, Ramya Chari, Beth Resnick, and Thomas Burke at the Johns Hopkins Bloomberg School of Public Health found that "multiple persistent contaminants were found together in the soils and sediments sampled in Orleans Parish," and that EPA studies of individual pollutants in soil and water understated potential health effects of cocktails of multiple chemicals at once. Subsequent studies of the Agriculture Street Landfill Superfund site found that sediments deposited around the area by Katrina and Rita contained high levels of benzo[a]pyrene, a carcinogen.

Seven years after Katrina, another storm demonstrated similar environmental risks. Hurricane Sandy flooded a region with numerous Superfund sites and ongoing constructions of Superfund containment structures: New Jersey and the New York City metropolitan area have one of the densest concentrations of

Superfund sites in the country. “There’s lots of local contamination that happens in a major storm,” said Burke, who once worked at the New Jersey Department of Environmental Protection and the EPA. “I think in retrospect, the New York and New Jersey metropolitan area was very lucky that in many sites the caps held, and the contamination was luckily not major.” Still, the extent of the contamination might have been underreported. As the Associated Press reported in late 2012, minimal testing and inspection by EPA officials meant the agency often didn’t even test the water or soil at some flooded locations.

It’s not clear that today’s EPA is any more equipped to handle flood disasters than earlier iterations were. One of the few concrete policies proposed by current EPA Administrator Scott Pruitt was an overhaul of the Superfund program, so that “the EPA's land- and water-cleanup efforts will be restored to their rightful place at the center of the agency’s core mission.” To that end, the EPA has commissioned a task force for revitalizing the program and is following their recommendations.

But environmentalist critics of Pruitt’s EPA argue that his plan, which will focus Superfund resources on sites “with the most reuse potential,” will merely end up channeling federal and private money into a small number of projects that can be salvaged for potential industrial or commercial use. Pruitt has also championed President Donald Trump’s proposed budget cuts to the agency—which would slash the Superfund by about one-third—as a way to “to reduce

redundancies and inefficiencies." While those cuts likely won't be implemented in full, and even Republicans in Congress have balked at Trump's proposed cuts, Superfund's history would suggest that funding reductions lead to fewer cleanups—and cause existing sites to languish and become more and more vulnerable to disasters.

**"So far no sites have risen to this level [of an immediate threat] that we are aware of."**

People living near Superfund sites have been afraid of that exact thing. In a bit of tragic foreshadowing, residents of the Fifth Ward, a historically black and low-income sector of Houston, held meetings in July expressing unease with the EPA budget cuts. In particular, they were concerned about any potential lapse in protection from the lead-poisoned waste in the middle of their neighborhood, where the Many Diversified Interests Superfund site covers an old industrial facility.

Officials at EPA headquarters haven't responded to requests for comment, but the agency has pushed back against criticisms of their work during and after Harvey. On September 8, the EPA released the results of spectroscopic analysis of neighborhoods near the Valero refinery—which the agency monitors, but isn't a Superfund site—that showed "no levels of targeted toxic chemicals were detected above the Texas TCEQ Air-Monitoring Comparison Values." Additionally, the EPA has outlined its plans to respond to any disruption of Superfund sites by Hurricane Irma, taking steps that "are consistent with how EPA has historically prepared Superfund sites for natural disasters, such as hurricanes." On Saturday, EPA spokeswoman Liz Bowman told the AP's Biesecker and Dearen that in the case of Irma, "so far no sites have risen to this level [of an immediate threat] that we are aware of."

Still, the storm, which began battering the Florida Keys Sunday morning, could prove a challenge, both to the EPA's response and to its reputation. On Thursday, Irma skirted Puerto Rico at Category 5 strength, whipping up waves that battered the coast of the main island, and hit outlying areas even harder. One of them was Vieques, a tiny island where for years residents have been battling health issues allegedly linked to a Superfund site. It contains depleted uranium and other heavy metals from old Navy munitions.

Natasha Bannan, a counsel with LatinoJustice who has worked in Vieques, said that while the island's immediate concern is surviving the storm, there's always a level of concern about the contamination spreading. "When you are in a toxic environment, of course there's risks," Bannan said. "I'm not a scientist, but when you have a hurricane come through that's moving soil and water, of course there are going to be risks."

Irma's devastation didn't end in the Caribbean. Over the following days, its path through Florida took it over dozens of hazardous-waste sites, including several where residents have long faced higher-than-average incidences of cancer.

And Irma won't be the last. Hurricane season is far from over, and Harvey and Irma will make large swaths of the country even more vulnerable to future storms. In all, with what seems to be an especially volatile hurricane season, multiple communities living near Superfund and RCRA sites in coastal areas will live in trepidation.

The EPA could never erase that trepidation in its entirety, even if the Superfund program were again funded by polluter taxes and the agency put full remediation plans and caps on every one. The forces of nature are unpredictable, and truly catastrophic storms can destroy even well-laid

protections. But currently, as sites have languished with no plan or budget to fix them, and as protections on remediated sites age, and as the agency has historically downplayed some concerns of environmental-justice communities, residents near contaminated areas have been placed in limbo.

Even in places where caps on contaminated sites hold, risk remains. Most sites aren't fully remediated, several have no firm timeline for remediation, and the caps in place degrade with age, wear, and exposure to floods. And all of this is happening as activists say the EPA has lost its ability to administer the program and cope with disasters. "The large majority of Superfund sites contain the nightmare in place," Burke told me. But for how long?


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